

## MANUFACTURING SYSTEM FOR THE MANUFACTURE OF COLUMNS, BEAMS AND OTHER STRUCTURAL MEMBERS

### Field of the Invention

5        The invention disclosed relates to a manufacturing system for the manufacture of columns, beams and any other member of a structure, based on the integration of two open cross section elongated members that - being joined to each other so that their main axes are parallel to the main axis of the column or beam they form - permit the manufacture of a wide variety of closed and hollow structural elements by using a small 10      number of the above mentioned open cross section elongated members.

### Background of the Invention

The introduction in the manufacturing technical field of the prefabrication concept represents one of the most important advances in the modernization of this industry. In 15      the case of industrial constructions, the prefabrication of open sheds and buildings based on steel structures has displaced the *in situ* manufacturing systems based on reinforced concrete and wood. Columns and other prefabricated elements that use the same materials, have been subsequently introduced.

The most economic prefabrication systems with respect to the use of materials are 20      generally made by reticulated structures. The use of non hollow steel beams, such as "T" or "double T" cross section beams, or tubes with cylindrical or other cross sections, in many cases is more convenient because their fabrication process is less labor-intensive and permits a better sealing of buildings and open sheds, thus preventing the entry of

water, air, insects, birds or rodents, as well as providing more aesthetic and varied architectural solutions.

Non hollow steel structural members, such as beams, are usually made by a hot-rolled process, as in the case of rails, "L", "T" and double "T" cross section beams, or by 5 cut and cold-drawn flat plates joined by different welding systems. In the case of wood, the members are produced by means of elemental "boards" which are glued in successive layers, permitting the production of curve shapes having different cross sections.

The current trend in the construction of open sheds is the use of roof structures made by prefabricated components in the form of wood, reinforced concrete or steel 10 beams, or steel reticulate structures. As concerns the columns, the trend is directed to the use of wood columns, prefabricated reinforced concrete columns or double "T" or tubular steel elongated members. The most convenient choice is selected based on the dimensions of the building and the associated mechanical requirements.

The Chilean application for patent N° 2711-98, "Fabrication System of Structural 15 Elements from Open Profiles", now pending, offers many advances to the current technique.

### **Summary of the Invention**

The invention disclosed comprises a manufacturing system for the manufacture of 20 columns, beams and any other member of a structure, based on the integration of two open cross section elongated members that - being joined to each other, so that their main axes are parallel to the main axis of the column or beam they form - permit the manufacture of a wide variety of closed and hollow structural elements by using a small number of the above mentioned open cross section elongated members.

Accordingly, a structural element is provided that comprises two elongated members having respective "C" type open cross-sections, and a joining means for joining the two elongated members to form a hollow transversal section.

Thus the manufacturer investment required is substantially reduced. In addition, 5 the workers who build the structures and buildings benefit from this invention by being able to count on a faster supply of components, which permits them to improve their competitiveness and offer shorter delivery terms.

#### Brief Description of the Drawing

10 Further objects, features and advantages of the invention will become apparent from the following detailed description taken in conjunction with the accompanying drawing showing illustrative embodiments of the invention, in which:

Fig. 1 shows an open cross section elongated member, in accordance with one embodiment of the invention;

15 Fig. 2 shows an elemental component, in accordance with an embodiment of the invention;

#### Detailed Description

For a better understanding of the invention, an example of its application is 20 described. This description is merely of an illustrative nature and does not restrict its scope. This is the case of a tubular steel elongated member of rectangular cross section. This type of elongated member, which is useful as a beam or pillar, is formed, in connection with the invented manufacturing system, by interlocking two identical open

cross section elongated members (1) to form an elemental component (see Figures 1 and 2).

The two elongated members are joined by a weld along its external edges, as indicated in number (5) of Figure 2. Since the above concerns light elongated members, 5 intermittent welds are provided in or near one or several edges of said elongated members, in order to prevent them from buckling when the tubular steel elongated member experiences bending or compression stress.

The weld joint of the two elongated members is completed along its entire extension or is supplemented by some type of seal, in order to isolate the interior of the 10 beam, column or structural member from the outside, and thereby avoid corrosion or the entry of rodents, liquids or other undesirable elements.

The elongated members (1) may have rounded bends (2), stiff edges (3) and core stiffeners (4) (see Figure 1). The purpose of these stiffeners is to optimize the mechanical performance of the elements, both for their handling prior to their assembly, as well as 15 their subsequent performance as part of the finished column or beam. The stiffeners also serve to prevent deformations that could be produced by the heating caused by the weld of the elongated members.

The simplicity and scant diversity of the necessary cuts and bends inherent in the fabrication of the elongated members of the application described in this invention permit 20 the use of more economic bending and cutting processes, as is the case with continuous cutters and bending machines.

Each one of said two elongated members that form a beam, column or member of a structure can be substantially long, in which case they are formed by several

correspondent elongated members joined one next to the other; in addition, all the elongated members that form the substantially long beam, column or member of a structure are arranged in a mismatched manner, by ensuring that the joints between them do not coincide in a common transversal section.

5        The invention whose patent is requested can be applied to steel and other metallic constructions, as well as to structures made of other materials, such as plastic and glass. It can also be used with composite materials, such as plastics reinforced with fiber glass and fiber cement.

10      The method for joining the elements that form the structural member can include not only fusion weld (arc welding, resistor and thermo fusion), but also riveting, bolting, screwing or assembling, according to the convenience of the application. The nature of the components also influences the joining method; for example, in the case of certain plastic materials, thermo fusion or adhesion using glues can be adequate.

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